

Notice of Allowability

Application No.

10/642,866

Examiner

Timothy M. Speer

Applicant(s)

SMITH ET AL.

Art Unit

1775

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed 12/27/05.
2. ☒ The allowed claim(s) is/are 1-18 and 32-36.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☐ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

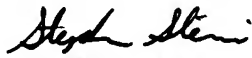
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date _____
7. ☒ Examiner's Amendment/Comment
8. ☐ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


STEPHEN STEIN
PRIMARY EXAMINER

EXAMINER'S AMENDMENT

1. An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. John Earley on January 31, 2006.

Claims 32, 35 and 36 have been amended as follows:

32. (Currently amended) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

- a) placing the substrate in an environment for treatment;
- b) dehydrating the surface of the substrate;
- c) evacuating ~~treatment~~ the environment;
- d) introducing a silicon hydride gas into the treatment environment to contact the substrate;
- e) heating the silicon hydride gas in the treatment environment;
- f) pressurizing the silicon hydride gas in the treatment environment;
- g) depositing a layer of silicon on a surface of the substrate;
- h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;

- i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;
 - j) purging the treatment environment with an inert gas to remove the silicon hydride gas;
 - k) cycling the substrate through steps c) through j) for at least one cycle;
 - l) evacuating the treatment environment; and,
 - m) cooling the substrate to room temperature;
- wherein said lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C;
- said period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes;
- said dehydration step ~~comprising~~ comprises heating the substrate to a temperature in the range of from about 300°C to 600°C for a duration of from about 10 to 240 minutes;
- including the step of heating the substrate in an inert gas or in a vacuum;
- said silicon hydride gas being selected from the group consisting of SiH_4 and $\text{Si}_n\text{H}_{n+2}$;
- said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature;
- said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C;
- said silicon hydride gas being pressurized to a pressure in the range of from about 0.1 torr to 2500 torr; and

said layer of silicon being deposited on the substrate surface for a period in the range of from about 1 to 480 minutes.

35. (Currently amended) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

- a) placing the substrate in an environment for treatment;
- b) dehydrating the surface of the substrate;
- c) evacuating ~~treatment~~ the environment;
- d) introducing a silicon hydride gas into the treatment environment to contact the substrate;
- e) heating the silicon hydride gas in the treatment environment;
- f) pressurizing the silicon hydride gas in the treatment environment;
- g) depositing a layer of silicon on a surface of the substrate;
- h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;
- i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;
- j) purging the treatment environment with an inert gas to remove the silicon hydride gas;
- k) cycling the substrate through steps c) through j) for at least one cycle;
- l) evacuating the treatment environment; and,

m) cooling the substrate to room temperature;

wherein said lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C;

said period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes;

said dehydration step ~~comprising~~ comprises heating the substrate to a temperature in the range of from about 300°C to 600°C for a duration of from about 10 to 240 minutes;

including the step of heating the substrate in an inert gas or in a vacuum;

said silicon hydride gas being selected from the group consisting of SiH₄ and Si_nH_{n+2};

said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature;

said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C;

said silicon hydride gas being pressurized to a pressure in the range of from about 1×10^{-7} torr to 2500 torr; and

said layer of silicon being deposited on the substrate surface for a period in the range of from about 1 to 480 minutes.

36. (Currently amended) A method of passivating a surface of a substrate to protect the surface against corrosion or the undesirable effects on a vacuum atmosphere, comprising the steps of:

a) placing the substrate in an environment for treatment;

b) dehydrating the surface of the substrate;

- c) ~~evacuating treatment~~the environment;
- d) introducing a silicon hydride gas into the treatment environment to contact the substrate;
- e) heating the silicon hydride gas in the treatment environment;
- f) pressurizing the silicon hydride gas in the treatment environment;
- g) depositing a layer of silicon on a surface of the substrate;
- h) controlling one or more of the duration of the silicon depositing step, the pressure of the silicon hydride gas, and the presence of contaminants on the substrate surface to prevent the formation of silicon dust;
- i) cooling the substrate to a lower temperature and maintaining the substrate at a lower temperature for a period of time;
- j) purging the treatment environment with an inert gas to remove the silicon hydride gas;
- k) cycling the substrate through steps c) through j) for at least one cycle;
- l) evacuating the treatment environment; and,
- m) cooling the substrate to room temperature;

wherein said lower temperature to which the substrate is cooled in step i) is from about 50°C to 400°C;

said period of time at which the substrate is maintained at a lower temperature is from about 5 to 100 minutes;

said dehydration step ~~comprising~~ comprises heating the substrate to a temperature in the range of from about 300°C to 600°C for a duration of from about 10 to 240 minutes;

including the step of heating the substrate in an inert gas or in a vacuum;
said silicon hydride gas being selected from the group consisting of SiH_4 and $\text{Si}_n\text{H}_{n+2}$;
said silicon hydride gas being heated to a temperature approximately equal to the gas's decomposition temperature;
said silicon hydride gas being heated to a temperature in the range of from about 300°C to 600°C ;
said silicon hydride gas being pressurized to a pressure in the range of from about 100 torr to 250 torr; and
said layer of silicon being deposited on the substrate surface for a period in the range of from about 1 to 480 minutes.

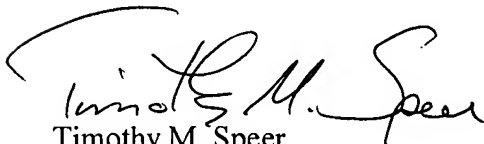
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Timothy M. Speer whose telephone number is 571-272-8385. The examiner can normally be reached on M-Th, M-F.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Deborah D. Jones can be reached on 571-272-1535. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Timothy M. Speer



STEPHEN STEIN
PRIMARY EXAMINER